Instructor. Dr Ian Knowles, Room 481A, Campbell Hall, iknowles@uab.edu, (205) 934-2154.
Office Hours. After class, or email/call for an appointment.
Prerequisite Course. MA227, or permission of instructor.
Class Meetings. MWF: 9:05-9:55am, Room HHB221.
Term Dates: First day of classes is Monday January 8, 2018, and the last day of classes is Friday April 20, 2018.
Grading. The course grade is calculated solely from the (approximately weekly) written assignments/projects. MA561 students will be required to prepare all assignment reports using the typesetting program T\LaTeX.
Course Outline:

• Practical examples of partial differential equations, including Poisson’s equation, the heat/diffusion equation and the wave equation; discussion of boundary conditions and their practical interpretation.

• Derivation of partial differential equations from physical laws.

• Introduction to MATLAB and its PDE Toolbox, and COMSOL.

• Introduction to finite difference and finite element solution methods.

• Continuum mechanics and linear elasticity.

• Fluid flow and the Navier-Stokes equations; class boat race for the “Aussie Cup”.

• Mathematical finance.

• The Maxwell equations and electromagnetic waves.

• Specialized modeling projects in topics such as heat flow, groundwater modeling, waveguides, structural failure, medical and industrial imaging, fluid mechanics including blood flow and hurricane simulation, and finance industry applications.